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Mothers' and Fathers' Interactions
with a Child with Motor Delays

by

Eftychia Ganadaki



A thesis submitted to the Faculty of Graduate Studies and Research in partial
fulfillment of the requirements for the degree of Master of Science

Department of Occupational Therapy

Edmonton, Alberta

Fall 2001



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University of Alberta

Faculty of Graduate Studies and Research

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled Mothers' and Fathers Interactions with a Child with Motor Delays submitted by Eftychia Ganadaki in partial fulfillment of the requirements for the degree of Master of Science.

Dedication

To my parents, Stefano and Matina

ABSTRACT

This study used the Nursing Child Assessment Teaching Scale to compare mothers' and fathers' interactions with their children during a teaching episode. Ten families with a 10- to 28-month-old child who was receiving early intervention for a motor delay were observed in their homes. Mothers obtained significantly higher Total Caregiver scores than fathers, $t(18) = 2.92$, $p = .009$. Examination of the subscales revealed significant differences for the Caregiver Contingency and Cognitive Growth Fostering subscales. Children's Total Child scores when they interacted with their mothers or fathers did not differ. Health care professionals should consider the father's interactional skills with his child, especially when asking fathers to teach their children new skills.

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CHAPTER 1

Introduction

Parent-child interaction is conceptualized as a transactional system of mutually adaptive responses between the dyad (Barnard et al., 1989). The quality of the parent-child relationship has an impact on the child's developmental outcomes. The parent's contingent and positive responsiveness appears to influence the child's cognitive (Moore, Saylor, & Boyce, 1998), language (Girolametto, 1988; Magill-Evans & Harrison, 1999; Sumner & Spietz, 1994), and motor development (McGrath & Sullivan, 1999). The child's developmental outcomes seem to be directly related to maternal variables, whereas fathers appear to influence their children more indirectly (Clarke -Stewart, 1978; Hunter, McCarthy, MacTurk & Vietze, 1987; Lewis, 1997).

The maternal style of interaction has been explored more than the paternal style since in the past the mother was considered the central influence on the child's development. This view was due to historical and socioeconomic factors that shaped the structures and functions of family life where mother was the primary caregiver and father had a patriarchic breadwinner role (Lamb, 1997). However, in the last three decades new social trends have contributed to diverse family environments (Marcil-Gratton, 1998), changing structures and functions of family life, and a shift in caregiving patterns with a co-parent role for both parents (Cabrera, Tamis-LeMonda, Brandley, Hofferth & Lamb, 2000).

Some of these social trends include policy changes regarding parental leave and child custody, the growth of feminism, and women's increased labor force participation. In 1994 the percentage of working mothers with a child under 3 years old was 56% (Human Resources Development Canada, 1998). Academics used system theory to reconceptualize the family and the contribution of each member. This shift led to a growing body of research on fatherhood that employed a family approach rather than focusing on mother as the main caregiver. Major national surveys have included questions about fathering in recent data collection (Marsiglio, Amato, Day & Lamb, 2000). The Applied Research Branch of the Human Resources Development Canada conducted a review of fathering measures to be added to the National Longitudinal Survey on Children and Youth (Peters, Arnold, Stewart, Crooks & Bouchard, 1998).

Lamb (1997) supported the position that both mothers and fathers are capable of being responsive to their children although fathers often appear less able. He also said that there are no biologically based sex differences and that differences are due to social conventions and reduced responsibility for their children. Research shows that while both parents are equally involved in play, mothers spend more time in childcare than fathers (Bailey, 1994a). Another difference between fathers and mothers is the type of play they use. Fathers appear to engage in more physical, tactile and arousing play than mothers (Clarke-Stewart, 1978). There is also evidence that fathers are more task oriented and focused on the goal of the activity when they interact with children with typical development (Conner, Knight, & Cross, 1997) and developmental delays (Girolametto & Tannock, 1994).

Research on parent-child interaction when the child has special needs is less frequent than for typically-developing children. “The lack of information about the impact on the family of children with disabilities was identified as a significant data gap” (Applied Research Branch of the Human Resources Development Canada, 2000, p.6). In addition, a comparison of the existing studies is hard as they are heterogeneous in terms of the coding system, children’s age, setting or the focus of the study. Concepts like contingency, responsitivity and sensitivity have been operationalized in many different ways and some times interchangeably.

Among the existing studies, there seems to be an agreement that similar interactional patterns are exhibited for dyads with typically-developing children and children with motor difficulties. The unique differences appear to be a matter of degree rather than of type of behavior (Barrera & Vella, 1987; Kogan & Tyler, 1973). However these results come from studies that focused only on mothers.

The existing research on father-child interaction has focused more on children with organically caused intellectual difficulties, while children with chronic illness, sensory impairments and physical disabilities have not been studied adequately (Hornby, 1994; Lamb & Laumann-Billings, 1997). Lamb and Laumann-Billings , after a literature review on fathers of children with special needs, concluded that fathers’ reactions to the diagnosis and his experience of stress are the predominant themes. The most consistent difference between fathers and mothers with a child with special needs is their feelings of stress. Mothers reported higher levels of stress associated with personal strain because of caregiving requirements, while fathers experienced more stress with respect to their attachment to their children (Beckman,

1991; Shonkoff, Hauser-Cram, Krauss, & Upshur, 1992). Although the direct and indirect impact of fatherhood is now recognized, research in the past years focused more on the quantity of time spent with the child. Information on the qualitative characteristics of his interactive behavior is limited (Marsiglio et al., 2000). This kind of information is essential for the development of effective intervention programs.

One measure of qualitative characteristics of parent-child interaction is the Nursing Child Assessment Teaching Scale (NCATS), developed to guide the observation of critical features in caregiver-child interactions during a brief semi-structured teaching episode. It consists of 73 items divided into 6 conceptually derived subscales (Appendix A). It was developed in 1970 at the University of Washington School of Nursing, as part of the Nursing Child Assessment Project (NCAP), which was conducted to determine predictors for children at risk for later developmental difficulties (Sumner & Spietz, 1994). NCATS scores were predictive of the child's future developmental outcome. Specifically, mother-child interaction scores predicted expressive language and correlated significantly with the child's mental developmental scores (Sumner & Spietz, 1994). Results from these studies helped to identify interactional patterns and plan appropriate intervention programs (Barnard, 1997).

Recent studies have explored paternal caregiving behavior using the NCATS (Brophy-Herb, Gibbons, Omar & Schiffman, 1999; Harrison, Magill-Evans & Benzie, 1999; Harrison, Magill-Evans & Sadoway, 2001; Nakamura, Stewart & Tatarka, 2000). In all these studies a consistent finding was that fathers scored lower than mothers for items that capture the parent's ability to foster the infant's cognitive

growth. It has been suggested that cut-off scores developed from studies with mothers should not be used with fathers, as there is evidence that fathers interact differently with their children. The development of a database that would allow comparisons with established norms based on studies with fathers is necessary (Brophy-Herb et al., 1999; Harrison et al., 1999). Similarly, studies focused on the interaction of fathers with their children with developmental motor delays have not been included in the development of NCATS database and cutoff scores.

Problem Statement

Knowledge of differences between mothers' and fathers' interactions with their young (less than 3 years of age) children with motor delays is limited. It is not clear if aspects of the interaction (e.g., contingency and responsiveness, response to child's distress and their ability to foster the child's social-emotional and cognitive growth) are the same or different. Understanding the similarities and differences between mothers' and fathers' interaction with their children with motor delays is necessary for the design of effective intervention programs for fathers and their children.

Purpose of the Study

The general purpose of this study was to explore similarities and differences in the interactions of mothers and fathers with their children with motor delays, during a teaching episode. The Barnard Model was used to conceptualize parent-child interaction and the NCATS was used to measure interactive behaviors during a teaching situation. The first comparison was between father's and mother's Total Caregiver NCATS scores. This provided information about similarities and

differences on specific aspects of parent's behavior during a teaching episode. Knowledge of fathers' interactional style can be used to enhance intervention plans. A second comparison was between the children's Total Child NCATS scores with each parent. The findings from this comparison enhance our knowledge of whether children with motor delays interact in a different way with mothers and fathers during a teaching episode.

Research Questions

- (a) Do fathers obtain different NCATS scores than mothers when they interact with their children with motor delays? It is hypothesized that fathers will have a lower Total Caregiver NCATS score than mothers.
- (b) Do children with motor delays obtain different NCATS scores when they interact with their mothers than when they interact with their fathers? It is hypothesized that children will have a higher Total Child score when interacting with their fathers than when interacting with their mothers.

CHAPTER 2

Literature Review

Theoretical Framework

The Interactive Model

The Interactive Model is a child health assessment model, which emerged after an extensive literature review on screening and assessment methods conducted by Dr. Kathryn Barnard and her research team at the University of Washington in 1970. The three main elements of the Interactive Model (the child, the caregiver and the environment) are represented as three circles overlapping in a point that represents the interaction among them (Appendix B) (Barnard & Eyres, 1979). Within this model, the child's characteristics, the caregiver's expectations and skills, and environmental social, physical and financial resources all influence the quality of parent-child interaction and the child's future development.

This framework is representative of the theoretical shift of that period. The maturational view of development was challenged by the view of developmental outcomes as the result of the “.interplay between child and context across time, in which the state of one affects the next state of the other in a continuous dynamic process” (Sameroff, 1993, p.4). With this model as background, the NCAP team developed the first version of NCATS, described as a simple and systematic method of evaluating parent-child interaction (Sumner & Spietz, 1994).

The Barnard Model

The Barnard Model reflects the conceptual basis for combining the items of the NCATS in specific subscales. The basic assumption is that the caregiver and child

both contribute to the quality of the interaction. Their abilities and skills are demonstrated through specific responsibilities. Each of them is illustrated in the Barnard Model (Appendix C) and consists of a subscale in the NCATS. The caregiver has the responsibility to be sensitive to the child's cues, to alleviate the child's distress, and to promote social, emotional and cognitive growth. The child has two responsibilities which are to give clear cues and to respond to caregiver cues. The child's ability to respond and give clear cues and the parent's ability to interpret these behavioral cues and respond contingently are important. Inability of any part of the dyad to meet these responsibilities may influence the quality of the interaction (Sumner & Spietz, 1994).

Although it is difficult to establish cause and effect relationships, the use of the NCATS to guide the observation of interactions between parents and children with developmental delays can provide knowledge about specific aspects of the interaction. Information can be obtained about caregiver's and child's behavior. Using the NCATS that is related to a broader body of theory allows interpretation of the results rather than simply describing them. In the following section the major concepts, which are embedded in the Barnard Model and measured on the NCATS, are described. Specifically, contingent responsiveness, sensitivity, positioning, affect, aspects of verbal communication and display of engagement and disengagement cues are discussed. The importance of these concepts for the parent-child interaction and research especially for children with motor delays is reported.

Contingency

Behavior-based contingency is defined as the relationship between the occurrence of two actions where the following response is dependent on the preceding behavior (Tarabulsky, Tessier, & Kappas, 1996). According to the Barnard Model contingent responsiveness is a mechanism that creates behavioral patterns, as children are able to detect contingency and connect their behaviors with their parent's responses. It is believed to be important for the child's sense of security (Sumner & Spietz, 1994) as well as their cognitive, behavioral, emotional (Tarabulsky et al.) and language development (Girolametto, 1988). Ethological attachment theorists also support the position that contingency is important for the formation of secure parent-infant attachment (Lamb, 1997).

However, in the same way that parent's contingent behavior has an impact on the child's development, the child's characteristics and behavior also influence parental contingency and responsiveness. Dickie (1987) reported a relationship between paternal competence (which included verbal and non verbal contingent responding) and the responsiveness of typically-developing 4-to 8-month-old infants. He suggested that children's characteristics are important as fathers and children affect and enhance the responsiveness of each other. As the child with developmental delays may be less responsive it is possible that fathers' contingency may be affected.

The significance of contingency is acknowledged by the theoretical model upon which the NCATS is based. The belief that immediate responses can shape behavioral patterns is reflected in the items that involve a time element. The response that the observer is looking for should occur within 5 to 10 seconds of the partner's

behavior. For young children this is considered very important as they have a limited memory span. Also, in the NCATS, contingency is measured separately from responsiveness. For example, a response (e.g., parent's smile) is contingent only when it is linked to the child's behavior (e.g., child performs better than the last attempt - Item 45). A parent who smiles in general during the interaction (Item 24) is considered responsive but his / her behavior is not evaluated as contingent. Last, contingency was statistically supported as being a construct measured by specific items in the NCATS. Hence, the NCATS can be used in a reliable and valid manner to obtain information about the contingency of interaction between parents and their children with motor developmental delays.

The Impact of Disability on Mother's Contingent Responsiveness

Shonkoff et al. (1992) used the NCATS to evaluate mothers' interaction with their 16-month-old children with developmental delays, and their 12-month-old children with motor impairments. They reported significantly lower contingency scores than the norms from the NCATS database, and these scores remained lower one year later. Similarly, Brooks-Gunn and Lewis (1984) found that mothers' responsiveness towards their 8-to36 month-old children with cerebral palsy, developmental delays or Down syndrome was affected. Responsiveness in their study was defined as "any behavior that immediately follows and is linked in a meaningful way to the behavior emitted by the other dyad member"(p. 787). They concluded that mothers vocalized, looked, and smiled more to children with a higher mental age as measured by the Bayley Mental Developmental Index (MDI). The MDI includes many items with a motor component. Therefore it may be that maternal contingent

responsiveness was related to the severity of the child's disability. Hanzlik and Stevenson (1986) reported that mothers of 21-month-old children with and without cerebral palsy were not significantly different for positive responsiveness, defined as " the proportion of antecedent behaviors that were followed by a non negative behavior"(p. 516). Pennington and McConachie (1999) examined patterns of conversation between mothers and their children with severe motor and speech impairments. They found that although children rarely initiate behaviors, when they did, their mothers responded contingently.

Evidence for Fathers' Contingency

There is evidence from the literature on typical development that fathers have the capacity to display adequate contingency. During a 90 second face -to-face interaction fathers and mothers were equally contingently responsive towards their 4-month-old infants (Braungart-Rieker, Murphy Garwood, Powders & Notaro, 1998). Similarly, both parents were contingently responsive towards their 20-month-old children during natural observations (Clarke-Stewart, 1978). Other studies have found that fathers respond less contingently than mothers. Harrison et al. (2001) used the NCATS to measure fathers' interactions with children ages 13 to 24 months during a teaching episode. They reported that fathers scored significantly lower than mothers on the contingency subscale. In the context of a story-retelling task fathers were also reported to be less contingent than mothers to their 2-year-old child's behaviors like initiations and exploration attempts (Conner, et al., 1997). This difference was suggested as being due to father's task orientation, which was also found for other contexts such as play (Kornhaber & Marcos, 2000; Marcos, 1995).

In summary, contingency appears to be related to developmental outcomes for children with and without developmental delays. The literature provides some evidence on how mother's contingency is affected when the child has developmental delays although findings are not always consistent. Fathers' ability to demonstrate contingent behavior with typically-developing children may be restricted because of their task orientation. Information on father's contingent behavior during a teaching interaction with their children with motor developmental delays is limited.

Sensitivity

In the Barnard Model sensitivity has an impact on the quality of parent-child interaction. A sensitive parent should monitor the child's state and behavior (verbal and nonverbal), be aware of the child's abilities and developmental needs, and respond with appropriate action (Sumner & Spiez, 1994). Lamb (1997) referred to sensitivity as a synonym for positive responsiveness. If we consider "response" as an action due to the application of an internal (hope for child's reaction) or an external stimulus (child's behavior), then sensitivity and positive responsiveness may be used interchangeably. It is important though to distinguish between sensitivity (or responsiveness) and contingency. Usually a contingent response is sensitive. However, a sensitive response can be either dependent on the child's behavior (contingent) or not. In the latter case a sensitive action can be a parent's initiation based on his/her expectation or knowledge of the child's needs.

Fathers are considered capable of being sensitive caregivers. However they appear less sensitive than mothers when they interact with their children (Lamb 1997). A reason for that may be that fathers are more directive and task oriented than

mothers. Conner et al. (1997) reported that fathers were directive and focused more on the goal of the activity during storytelling than mothers. Lamb (1997) suggested that another reason why fathers appear less sensitive towards their children may be that they usually spend less time together. According to the 1998 General Social Survey, full time employed Canadian mothers spent more time than fathers with their children under the age of five (The Daily, 2000). Less experience may result in a lack of knowledge of the child's cues and current developmental skills and needs (Lamb 1997). Tomasello, Conti-Ramsden, and Ewert (1990), as cited by Kornhaber and Marcos (2000), reported that fathers failed to understand the child's speech and asked for more clarifications in comparison with mothers.

Bailey (1994a), in a longitudinal study, compared frequencies of time spent on caregiving and play by parents and concluded that fathers spend less time than mothers in caregiving while they were equally involved as playmates. He reported that paternal involvement in caregiving was negatively related to the quality of interaction (Bailey, 1994b). Similarly, Grych and Clark (1999) reported that in dual-earning families fathers' sensitivity towards their children at 4 and 12 months of age decreased as their involvement in caregiving increased. As this relationship was opposite for single -income families (paternal sensitivity increased as their involvement in caregiving increased), they suggested that if the increase of involvement occurs from a sense of obligation instead of choice and interest this may have a negative impact on paternal sensitivity. However, Feldman (2000) reported a positive relationship between sharing of household and childcare responsibilities and paternal sensitivity towards their 5-month-old infants in dual -income families. In this

study, sensitivity was defined as acknowledgement and responsiveness to the infant's cues, display of positive affect, warm and appropriate vocalization, resourcefulness and fluency of interaction.

The Impact of Disability on Parent's Sensitive Responsiveness

It appears that the child's developmental status may have an impact on parents' sensitive responsiveness. Hanzlik and Stevenson (1986) used an observational coding system where they recorded dyadic antecedent and consequential behaviors every 15 seconds. They concluded that mothers displayed increased commands and physical contact towards their 21- month-old children with physical disabilities, when compared with mothers interacting with typically-developing children. Barrera and Vella (1987) used a response matrix for behavioral coding of 10 minutes of free play. They found that mothers of 10-month-old infants with physical disabilities used more commands in general and responded to the infant's interactive play with commands and verbalizations while mothers of children without physical disabilities responded with play. Kogan and Tyler (1973) also found that mothers were controlling during unstructured play with their 15- to 48-month-old children with physical disabilities. In their coding system, controlling behaviors were orders, repositions and prohibitions.

It appears that mothers with children with special needs display increased use of physical contact commands, and orders, that are interpreted as maternal directiveness. The appropriateness of this behavior for children with special needs is ambiguous. Hanzlik (1989) suggested that excessive amounts of physical contact and direction might restrict exploratory behavior and have a negative impact on child

development. Moore et al. (1998) reported that when mothers demonstrated high amounts of directiveness towards their 2-year-old at risk children, their responsiveness was not appropriate in manner and timing (contingency). In contrast, contingently responsive mothers displayed low amounts of directiveness. They conclude that the amount, the appropriateness and the manner in which directiveness is displayed are important.

Few studies have focused on fathers' sensitivity neither to their special needs child nor on the amount of time that they spend with their child. Bristol, Gallagher and Schopler (1988) reported that fathers spend less time than mothers in caregiving tasks for their 2 to-6-year-old boys with severe communication impairments, irrespective of maternal employment. Decreased involvement was related to the severity of the impairment. In contrast, Smith (1986) reported that both parents of physically disabled children spend greater amounts of time with their children than parents of non-disabled children. Both mothers and fathers reported similar hours of childcare. More research on fathers' ability to be sensitive towards their children with special needs is required.

The NCATS can be used to provide information on aspects of sensitivity other than directiveness. It contains a specific subscale which gives information on parent's ability to be sensitive to the child's cues. Items such as positioning the child safely and in a way that allows for eye-to-eye contact and reading of cues measure sensitivity. Other aspects of sensitivity include the parent's timing of instructions and encouragement of the child's initiations and exploring behaviors (Sumner & Spietz, 1994). The way that parents position their children with motor delays, and the

relationship between the child's position and the quality of their interaction has not been reported in the literature. Items that tap parent's sensitivity are also included in other subscales (e.g., Item # 37: "allows non-task manipulation of the task materials after the original presentation").

Affect

According to the Barnard Model, affect is the communication of mood or emotions that results in a negative or a positive and warm atmosphere between the parent and the child. Positive affect is reflected in the caregiver's nonverbal communication (smile, kiss, gentle touch) and is related to the child's emotional security and future developmental outcomes. A parent who combines positive affect with positive (general praise) and encouraging (cheerleading) types of statements facilitates the social -emotional growth of his/ her child (Sumner & Spietz, 1994). Clarke -Stewart (1978) reported that mothers' expressions of warmth and positive emotion towards their 20-month-old children was one of the behaviors that were highly and consistently correlated with measures of the children's intellectual competence. Similarly, one of the components of parental competence that Dickie (1987) found to be correlated with infant's responsiveness was the expression of warmth and pleasure.

Comparisons between mothers' and fathers' ability to demonstrate positive affect during interactions with their typically-developing children are ambiguous. Field (1981) reported that fathers smiled and laughed more than mothers towards their 4-month-old infants during a 3-minute face-to-face interaction. However, Clarke-Stewart (1978) reported that mothers and fathers demonstrated similar

affection towards their 20-month -old children during naturalistic observations. This is in agreement with results from studies that used the NCATS to compare parents' interactive behavior with 3- to 6- month-old infants (Brophy-Herb et al., 1999; Nakamura et al., 2000). The comparisons were made with a normative database of mother-infant dyads, while controlling for demographic variables. However, fathers of older children (13- to 24- month-olds) scored significantly lower on the social-emotional growth fostering scale of NCATS (Harrison et al., 2001) than did mothers.

The Impact of Disability on Parent's Expression of Positive Affect

Kogan and Tyler (1973) reported that during a play situation mothers displayed more positive affect to their 15- to 48-month-old children with physical disabilities compared to a control group of typically-developing children. Positive affect included friendly statements, warm tone, praise and physical affection. The same mothers exhibited more negative affect to their children during a therapy session. It appears that the context in which the interaction takes place may have an impact on the quality of affect displayed by the parents. During a teaching episode mothers of 16-month-old children with developmental delays and 12-month -old children with motor impairments scored significantly lower on the Social-Emotional Growth Fostering subscale of the NCATS than did mothers of typically-developing children (Shonkoff et al., 1992). Information on father's expression of affection towards their children with developmental delays is limited. A study that compared parents' behavior during face-to-face interactions with their 4-month-old high-risk infants found that mothers had significantly lower frequencies of smiles than mothers

in the comparison group, while fathers' behavior did not differ significantly (Field, 1981).

Fathers seem to be equally capable of affectionate behavior although findings are not always in agreement. Disability may have an impact on the caregiver's expression of affect especially during more demanding interaction episodes. It appears that the child's special needs may have a stronger impact on mother's expression of affect than father's, but more research evidence is required. The Social-Emotional Growth Fostering subscale, which is included in the NCATS, contains items that capture the caregiver's ability to communicate positive affect towards the child. Specific behaviors that are included are affectionate forms of touch, smiles, general praise and encouragement and statements made in a positive feeling tone. The NCATS can provide information about mothers' and fathers' affect towards their children with motor developmental delays, during a teaching episode.

Aspects of Verbal Communication

Verbal communication is a central element of parent-child interaction. Contingent verbal responses foster language development (Girolametto, 1988) and a parent's clear and rich descriptions promote the child's cognitive growth. In the Barnard Model the quality of interaction depends on the caregiver's ability to provide contingent verbal responses to the child's vocalizations. The "Teaching Loop" (Appendix D), which is described in the theoretical framework of the NCATS, consists of four elements that are contingent on each other. These are alerting, instruction, performance, and feedback (Sumner & Spietz, 1994). Parents should alert the child before they provide verbal instruction, allow time for the child's

vocalizations and use encouraging statements and constructive feedback, which communicate a positive feeling during the interaction.

Differences Between Fathers' and Mothers' Verbal Communication

Studies from the previous decades that compared mothers and fathers during unstructured interactive episodes reported that mothers vocalized more to their young infants (Clarke- Stewart, 1978; Lamb, Frodi, Hwang, Frodi & Steinberg, 1982). Contemporary research focuses on qualitative characteristics of parents' communicative behavior. Kornhaber and Marcos (2000) found that the content of fathers' messages to their 2-year-old children during play was more linked to the task performance. Marcos (1995) reported that fathers and mothers were also different when comparing the function (social goal) of their messages. Fathers produced more action directives (instructions and requests for objects and actions) while mothers produced more assertives (descriptions of objects, actions, persons). The researchers concluded that fathers are more task-oriented, which is in agreement with findings from Conner's et al. (1997) research. They found that fathers were more directive with their 2-year-old children during a story-telling task while mothers were more contingent and allowed for the child's exploratory behavior.

Another difference between mothers' and fathers' language function, as reported in a literature review by Le Chanu and Marcos (1994) is that fathers appear less likely to fine- tune their speech to the child's developmental level. As a result father-child interactions may be more demanding for the child. In contrast, Pratt, Kerig, Cowan, and Cowan (1992) found that mothers' and fathers' conversational styles during a 10-minute interaction with their 3.5-year-old children were similar.

The dyads were asked to perform a number of tasks including story telling. The observation coding system included directiveness, responsiveness, and questioning.

The Impact of Disability on Aspects of Parents' Verbal Communication

There is evidence that mothers, as an attempt to elicit more responses from a child with special needs, exhibit increased verbal initiations and commands. Hanzlik and Stevenson (1986) found that mothers used more commands during play with their 21-month-old children with cerebral palsy and cognitive difficulties, compared to groups matched for chronological and mental age. Brooks-Gunn and Lewis (1984) reported that mother's distal behaviors (e.g., vocalizations, looks, smiles) to their 8- to 36-month-old developmentally delayed children was related to child's mental age as measured by the Bayley MDI. Pennington and McConachie (1999) found that mothers asked their children with severe motor and speech impairments mostly close ended questions where they already knew the answer. In this way they provided restricted conversation patterns to their children, which may have an influence on the child's communication skills and also on their cognitive development.

Comparisons between fathers' and mothers' verbal communication towards their children with motor developmental delays are limited. Girolametto and Tannock (1994) compared the conversational directiveness of mothers and fathers to their children with developmental delays or Down syndrome during play. They reported that when the child was involved in the interaction fathers and mothers were similarly responsive to the child. When the child was uninvolved, the mothers continued to be responsive to the child's focus while fathers were more directive. According to their coding system, fathers used more commands and questions to

elicit a response and also tried more to re-direct the child's attention to adult-selected topics (topic control).

In summary, it appears that mothers and fathers have different communication styles with their children. The Cognitive Growth Fostering Subscale in the NCATS provides us with information about the caregiver's ability to provide cognitive stimulation appropriate for the developmental level of their children by using unambiguous verbal and non-verbal directions and describing perceptual qualities of the task materials to the child. As children with motor developmental delays are already at risk for cognitive delays due to limitations of exploratory behavior because of atypical development, the parent's ability to promote the infant's cognitive development through their communication should be explored.

Engagement and disengagement cues

Engagement and disengagement behaviors shape a process through which individuals can focus and withdraw during their interactions, as a way to regulate their attention. Children give verbal and non- verbal cues when they are ready to interact (engage) and when they need to withdraw (disengage) during an interaction. According to the Barnard Model the child's ability to provide the caregiver with clear cues, and also in a contingent way, affects the parent's responsiveness and contributes to the quality of interaction. The child's cues can be subtle or potent. A sensitive parent can recognize the child's subtle and potent disengagement cues, adjust his/her behavior accordingly and alleviate the child's distress (Sumner & Spietz, 1994).

The Impact of Disability on Child's Clarity of Cues and Contingent Responsiveness

Brooks-Gunn and Lewis (1984) compared 3 groups of children with different diagnoses (cerebral palsy, developmental delay, Down syndrome) and a wide range of ages (3 to 36 months). They reported that the frequency of distal behaviors (e.g., vocalizations, looks, smiles) increased with chronological and mental age as measured by the Bayley MDI. Barrera and Vella (1987) reported that 10-month-old children with physical disabilities vocalized less and had less eye contact with their mothers when compared with typically-developing children. Pennington and McConachie (1999) coded the communicative functions (e.g., requests for attention, information and responses) of 20 mostly school-aged children with severe motor and speech impairments, in a single sample study. They found that the child's initiations of behaviors were less than the parent's initiations.

Less information is available on child's contingent responsiveness as most of the studies report mainly frequencies of observed behavior. Hanzlik and Stevenson (1986) studied 21-month-old children with cerebral palsy. Their observational coding system included the construct of positive (contingent) responsiveness ("the proportion of antecedent behaviors that were followed by a nonnegative behavior", p. 516). They found that children with cerebral palsy were similarly positively responsive compared to typically-developing children matched for chronological and mental age. The NCATS measures responsiveness by looking not only at the positive aspect of it, but also responses expressed through the child's subtle and potent disengagement cues. For example, when the caregiver moves closer than eight inches from the child's face, or intrudes in the child's use of materials, an exhibition of disengagement cues is

anticipated. Shonkoff et al. (1992) reported that 16-month-old children with developmental delays had lower scores on the NCATS than the normative sample of the same chronological age, especially on the subscale of responsiveness. However Palisano, Chiarello and Haley (1993) used the NCATS to evaluate mother's interaction with their 7- to 35-month-old children with motor delays as a result of a variety of diagnoses (e.g., Down syndrome, cerebral palsy, premature birth). They found that the Total Child scores were similar to the mean scores of typically-developing children provided by the NCATS database.

Child's Ability to Adjust His / Her Cues

Research supports that children can adjust their behaviour to fit the characteristics of the person they interact with. Kornhaber and Marcos (2000) examined children's linguistic communication (function and content) with their mothers and fathers and found that it was different. They suggested that children as young as 2 years old are guided by expectations created by experience and they can adjust their communicative behaviour to match the behaviour of the person with whom they interact. Children with disabilities have also displayed the ability to adjust their behaviour. Pennington and McConahie (1999) reported that a sample of 20 children with severe motor impairments and motor speech disorders produced a wider range of communicative functions (responses and requests for attention, information, clarification) during a conversation with a therapist than with their parents.

There is also evidence that children may behave differently with their mothers and fathers. Typically-developing 20-month-old infants (Clarke -Stewart, 1978) and 3-month-old high-risk infants (Field, 1981) displayed a preference for their

fathers that was explained as being due to the arousing nature of play that fathers usually employ. When the dyads were observed during a teaching episode, typically-developing children were also more responsive with their fathers (Brophy-Herb et al., 1999; Harrison et al., 1999; Harrison et al., 2001; Nakamura et al., 2000). However, the father-child scores were compared with a normative database of mother-child dyads. Harrison and Magill-Evans (1996) compared fathers' and mothers' interaction with their children within the same family system. They concluded that healthy full term and preterm infants at 3 and 12 months of age responded similarly to their fathers and mothers.

Parent's Response to the Child's Potent Disengagement Cues

Observation of parents with typically-developing children found that mothers held their 20-month-old infants, in order to soothe them, more than fathers (Lamb et al., 1982). Studies that used the NCATS to evaluate fathers' ability to alleviate the distress of their children found no significant difference when compared with normative scores for mothers (Harrison et al., 1999; Nakamura, 2000). Only low-income fathers (Brophy-Herb et al., 1990) and fathers of toddlers (Harrison et al., 2001) scored significantly lower on the response to distress subscale. It is not clear how mothers and fathers differ in their ability to soothe a distressed child with developmental delays. Shonkoff et al. (1992) reported lower scores for mothers of children with developmental delays but comparison with fathers' scores has not been performed.

In summary, it appears that children with disabilities have the capacity to provide their parents with cues although they do it less often and this frequency seems

to be related to the child's psychomotor skills. Moreover there is evidence that children can adjust their interactive behaviour to fit the characteristics of the person with whom they interact. The NCATS includes a subscale that provides information on the child's clarity of cues towards his/her parent. Scores can be obtained also for children's contingent behavior. By comparing parents' interactions with the same child, we can gain useful information about the child's ability to display cues and respond contingently with different interactional partners. The NCATS also includes a subscale which is focused on the caregiver's ability to recognize and respond especially to the child's potent disengagement cues. This subscale provides us with information about the parent's ability to alleviate the child's distress. Fathers and mothers have not been compared on their ability to respond to the distress of their child with motor developmental delays.

CHAPTER 3

Methodology

Study design

The nature of the study was exploratory and descriptive. An observational, analytical design was employed to compare mothers' and fathers' interactions with their children diagnosed with motor delays.

Recruitment

A convenience sample of children with motor delays was recruited from early intervention programs and programs at the Glenrose Rehabilitation Hospital in Edmonton. The focus of the study was on children with delays in the area of motor development.

Inclusion Criteria

Families where both parents were available and willing to participate, and who spoke English to their child, were included. Children with a diagnosis that indicated long-term problems with motor functioning (e.g., cerebral palsy, spina bifida) were eligible to participate, in addition to children with a developmental delay as indicated by their scores on a developmental scale. These scores had to be at least 1.5 standard deviations below the mean on the Peabody Developmental Motor Scales (Folio & Fewell, 1983), below the 5th percentile on the Alberta Infant Motor Scales (AIMS) (Piper & Darrah, 1994), or indicate a probable delay on gross and /or fine motor scales of the Diagnostic Inventory for Screening Children (DISC) (Amdur,

Mainland & Parker, 1998). Children with a diagnosis of Down syndrome, a progressive neuromuscular disorder or a multiple handicap with a non-correctable sensory impairment, were excluded from the study.

Request of Cooperation

The coordinators of the clinics for preschool children at the Glenrose Rehabilitation Hospital, and the Early Intervention Programs around Edmonton were contacted. They were asked to identify families that met the inclusion criteria described above, by reviewing the children's files. The coordinators were provided with brochures (Appendix E) and information letters (Appendix F) in order to make the initial contact and introduction of the study. To ensure that all families received the information about the project, a follow-up procedure was arranged for families who were contacted by mail and had not responded. A therapist, employed at the Glenrose Rehabilitation Hospital in programs other than those used to contact families, was hired to phone these families. The purpose of the follow-up calls was to find out whether the families had received the information letters and whether they would agree to have their contact information be released to the investigators. The therapist followed a specific procedure for all the phone calls using the script in Appendix G.

From all sources, a total of 34 families were identified as eligible. Only 10 families agreed to participate in the study. This low recruitment rate may be due to the fact that both parents were required to participate and fathers appeared to be very busy or not available in some cases. Increased caregiving, parental stress, and time

spent with health care providers as a result of the child's developmental status, may also contributed to the low recruitment rate.

Once families had indicated their interest, the researcher phoned them in order to answer questions and make arrangements for the observation at a convenient time and place. Parents could choose to have their child observed at home, or at the University of Alberta, or the Glenrose Rehabilitation Hospital. Two of the families choose the Glenrose as the preferable place for the observation to occur. The rest of the families decided to be visited in their homes. Mothers and fathers signed a consent form (Appendix H) before the observation began.

Study Participants

Sample Size Estimation

Before the actual data collection a sample size calculation was performed. According to Kraemer and Thiemann (1987) it was estimated that for a 5% one tailed test and 99% power a sample size of 14 for each group was required. The estimated values were based on preliminary evidence available from a study done by Harrison et al. (2001) who used the NCATS with mothers and fathers of typically developing toddlers.

Description of Mothers and Fathers

A total of 10 families participated in the study. All parents were living together, were Canadians, and were not recent immigrants to Canada. All but 3 parents were White/Caucasian. Two parents from the same family unit were Canadian-Indians and one father was Canadian-Japanese. The participants lived in Edmonton and the surrounding area except for two families. The mean age for

mothers and fathers was similar. Fathers and mothers had a similar average level of education. The fathers were all employed full-time while 3 mothers were not working, 2 were working part-time at home, and the rest were full time employees. The median income reported by the major caregiver was \$60,000-69,000 (n=9). Parents' years of age and education are summarized in Table 3.1.

Table 3.1 Mothers' and Fathers' Years of Age and Education

	Mothers*			Fathers		
	Mean	(SD)**	Range	Mean	(SD)	Range
Age (in years)	31.67	6.02	24-40	33.70	6.55	26-48
Education(in years)	13.85	2.52	11-18	13.60	3.72	6-19

*n = 9 for mothers' age **SD: standard deviation

Based on information from a demographic form that parents completed, in all but one family the mother was the major caregiver. Only one family reported shared responsibility for their child. However, in two more families, mothers and fathers reported equal hours of care and play with their children during work and non-work days. For the rest of the families the mothers reported more hours of care giving during work and non-workdays and more hours of play during working days than did fathers. Fathers reported more hours of play with their child during non-workdays. The average number of times that fathers had sole responsibility for their children the week before their participation in the study was 2 (range from 0 to 7). However, half of the fathers reported that this was less than the usual number of times.

Description of the Children

The children in this sample ranged from 10 to 28 months of age with an average age of 21.8 months. Most of the children (8) were the first-born child in the family and one child was a twin. There were 6 boys and 4 girls in the sample. For all the cases the referral agencies provided a diagnosis to describe the child's motor status. Only in one case a therapist reported a participant with a probable gross motor delay as was indicated by the child's scores on the DISC (Amdur et al., 1998). The severity of impairment for the children was determined through administration of the Gross Motor Function Classification System (GMFCS) (Palisano et al.). Six children (ages 17 to 28 months) had mild motor difficulties and were walking independently (two with developmental delay, one with ataxia, one with hemiparesis, and two with cerebral palsy). The remaining four children (ages 10-28 months) were dealing with more severe difficulties in gross motor development (one with hemiplegia, two with spina bifida, one with hydrocephalus). Two children scored at level II of the GMFCS and two at level III and were receiving training to use an assistive device in order to walk. However, their upper limb motor skills were less affected. There was no need to adapt the evaluation materials of the NCATS as a result of the child's limitations for any of the children. The children's cognitive and language skills were not measured. However, all of the children vocalized during the observations and understood verbal directions.

Data collection

NCATS

The NCATS was used to evaluate parent-child interactions. It was developed to guide the observation and measurement of critical features in caregiver-child interactions, during a brief (usually less than 10 minutes) semi-structured teaching episode. It is designed to place some strain on the interactive system in order to assess adaptability. It is an observation measure that consists of 73 binary items, which are scored by a certified observer on a “yes/no” scale. The items are divided into 6 subscales that reflect the basic elements and assumptions of the Barnard Model, described earlier. The NCATS provides a Total Caregiver score that consists of four subscales (Sensitivity to Cues, Response to Distress, Social-Emotional Growth Fostering and Cognitive Growth Fostering) and a Total Child score that consists of the two subscales (Clarity of Cues and Responsiveness to Caregiver). Contingency scores for the caregiver and the child can also be obtained. Higher scores indicate more optimal parent-child interactions.

The developers of the NCATS reported Cronbach's coefficient alphas for split-half reliability over the accepted level of .70 (Sumner & Spietz, 1994), indicating that the items measure the same construct (Law, 1987; Streiner & Norman, 1995). Cronbach's alphas are .87 and .76 for the Total Caregiver (mother) and the Total Child score respectively. Reliability coefficients for test-retest reliability are high (.85) for the Total Caregiver (mother) score (Sumner & Spietz). A lower coefficient (.55) for the Total Child score may be due to the four-month time interval of the study and reflect true changes in the children's scores. The developers of the

measure do not provide reliability information based on studies with fathers. Harrison et al. (2001) reported that the fathers had lower Cronbach's alphas (.70) when compared to the mothers (.75) for the Total Caregiver score.

Regarding the concurrent validity of the scale, Sumner and Spietz (1994) reported a significant association between the NCATS Total Caregiver and the Bayley MDI (Bayley, 1994) at 24 months of age (.46). Correlations were also found between NCATS and the Total score of the Home Observation for Measurement of the Environment (HOME) (Caldwell & Bradley, 1984). The strongest correlations are for the Social-Emotional and Cognitive Growth Fostering subscales (.52 and .59 accordingly). These moderate correlations were anticipated as the HOME measures the parent's responsiveness like NCATS but focuses more on the appropriateness of child's environment (e.g., availability of play materials).

Evidence of predictive validity is provided, as the NCATS scores were predictive of children's receptive language at 18 months (Magill-Evans & Harrison, 1999), and both expressive and receptive language at 36 months (Sumner & Spietz). Studies that support the power of the tool to discriminate between groups (e.g., pre-term and full-term infants) who are expected to differ in dyadic interactions have also been reported (Sumner & Spietz, 1994).

Demographic Data Form

A demographic data form, initially developed for the study of Harrison et al. (1999), was used for collection of demographic information in this study (Appendix I). The primary caregiver, as identified by the parents, completed a version of the data form, which included the level of income. A second version was used for the

secondary caregiver, which looks at the number of times that the parent is solely responsible for the child in addition to education, employment and time spent with the child. This information was used solely for describing the sample. An open-ended type of question was used to capture the amount of hours that the caregiver spent with the child. As report of time is highly subjective, the parents stated a wide range of care and play giving (from 15 minutes to 15 hours). Although it was possible to determine which parent reported more hours with the child, statistical comparisons were not done to compare average hours of care and play between parents because concerns about the validity of the number of hours reported. For example a parent who was working full time outside the home reported 10 hours of care and 8 hours of play during a workday which appeared to be an overestimate.

Gross Motor Function Classification System for Cerebral Palsy

The Gross Motor Function Classification System for Cerebral Palsy (Palisano et al., 1997) (Appendix J) was used to describe the child's motor function level. It is an ordinal, five-level classification system which represents clinically meaningful distinctions in motor function. The descriptions in each level are broad and refer to the child's current gross motor function. The use of the system does not require special skills or procedures and the evaluator can do this classification during a home visit as it uses ordinary performance of self-initiated movements associated with sitting and walking. It is appropriate for children until 12 years of age. Although it was designed for children with cerebral palsy, it is appropriate as a measure of general motor function.

Palisano et al. (1997) reported that nominal group process and Delphi survey methods with consensus among 48 experts were employed to establish content validity. For estimation of interrater reliability the researchers used the kappa coefficient (κ) which is “a statistic used to correct for chance agreement” (Palisano et al., p. 218). For children less than 2 years old, interrater reliability (κ) was .55 and for children 2 to 12 years old was .75. The κ coefficients were higher for Levels I and II than for the other three levels. Wood and Rosenbaum (2000) conducted a study that was based on a retrospective chart review of 85 children with cerebral palsy that were followed from 2 to 12 years of age. The investigators reported a high intrerrater reliability as was indicated by a generalisability (G) coefficient of .93.

Information from Referral Agency

The coordinators of the programs who reviewed the children’s files for recruitment purposes were asked to indicate the child’s diagnosis, or the child’s scores on a developmental test (Appendix K). Parents gave their consent for release of this information.

Procedure

Pilot home visits were performed with 2 families that did not meet the inclusion criteria, in order to try the data collection procedures. Sound problems became evident from the first pilot. The sound recorder that was built in the camera was not sensitive enough to capture all the vocalizations. As verbal communication is important during interaction episodes, it was decided to use a separate sound recorder that was placed in a short distance from where the dyad was interacting. The external

recorder was tested during the second pilot home visit and the most appropriate position was determined.

All except two observations took place in the home of the participants, at a time that was convenient for both mothers and fathers. Parents completed the consent form and the video equipment was set up and tested. One parent did the NCATS first while the second parent completed the demographic questionnaire. After that, they switched tasks. The order of interactions was counterbalanced across subjects by gender of parent to control for any order effects of interacting first with mother or father. Each parent was given a standardized list with activities and was asked to select one that was new for the child and a little above of the child's current developmental skills. In case of immediate success at the performance of the task, the parent was asked to repeat the teaching episode with the next activity on the list. Each parent did a different activity with the child. General positive feedback was provided to the parents about the interaction episodes observed. The duration of each teaching episode was 5 to 10 minutes. The duration of the visits was approximately 30 to 40 minutes. After the visit, the investigator scored the child's gross motor function and used the videotape to score the interactive episodes with the NCATS.

Consistency of Rating

The NCATS is a standardized test in which the procedures related to observation and scoring, are well defined and fixed. Users have to complete a training program and achieve at least 90% agreement with the training database on five different observations for research purposes (Sumner & Spietz, 1994). The principal investigator, who conducted the evaluations, is trained and certified by the NCAST

program to use the tool for research purposes. As she was aware of the purpose of the study a second certified rater, blind to the purpose of the study, was hired to score 25% of the videotapes in order to ensure consistent rating. The mean percentage of point-by-point agreement was 87.2% with a range from a low 81% to a high 90%.

Ethical Considerations

Ethical approval from the Health Research Ethics Board and administrative approval from the Capital Health Authority for the study was received before the beginning of the study. Parents were aware of the nature and the goal of this study from the initial contact. The investigator during the home visit explained the information letter and answered any questions that parents had. Information about confidentiality and freedom to withdraw was included in a consent form, which parents signed. The data obtained is stored and protected in a locked file cabinet at the University of Alberta. Access without permission is not available. Identifying information is not attached and codes have been given to each participant. All information is confidential. There was no evidence of parental abusive behavior, which according to the professional codes of ethics, should be reported. At least 5 years after the study is done all the information will be destroyed.

Statistical Analysis

Descriptive and inferential statistics were computed using the Statistical Package for the Social Sciences (SPSS 10.0, 2001). For descriptive statistics calculation of mean and standard deviation were performed. Two Student's t-tests were calculated. For the t-tests, Bonferroni's correction was used (level of significance, .05, divided by the number of comparisons being made) to deal with the

multiple comparison problem, where the probability of finding a significance difference increases when many comparisons are being made (Norusis, 2001). The first t-test looked at the difference between mothers' and fathers' Total Caregiver scores. The second t-test examined the difference between children's Total Child scores when they interact with mothers and fathers. Parametric statistics were used in order to compare the results to the existing literature. To determine whether the data came from a normal distribution, histograms were plotted using SPSS. Examination of the histograms revealed that both mothers' and fathers' distributions were skewed although fathers' scores were more normally distributed than were mothers' scores. Therefore non-parametric tests were also calculated to confirm the results. The Mann-Whitney U test was employed to compare the means as it does not require normally distributed data (Munro, 1997).

CHAPTER 4

Results

Mothers' and Fathers' NCATS Scores

The first t-test was performed to determine if there were any differences between mothers' and fathers' Total Caregiver scores. As seen in Table 4.1, mothers obtained significantly higher scores than fathers, $t (18) = 2.92$, $p = .009$. Non-parametric statistics confirmed this result. Mothers scored significantly higher (mean rank = 13.9) than fathers (mean rank = 7.1) for the Total Caregiver score, $p = .009$.

Table 4.1 Participants Total and Subscale Scores on the NCATS

NCATS subscales	Fathers		Mothers	
Caregiver	Mean	(SD)	Mean	(SD)
Sensitivity to Cues	8.4	(.7)	8.8	(1.14)
Response to Distress	8.5	(1.78)	9.6	(1.35)
Social-Emot. Growth Fostering	7.2	(1.03)	7.2	(1.4)
Cognitive Growth Fostering	10.1	(2.02)	12.3	(2.21)
Total Caregiver	34.2	(3.01)	37.9	(2.64)
Caregiver Contingency	11.7	(1.64)	14.2	(2.04)
Child				
Clarity of Cues	9.2	(.92)	8.9	(1.10)
Responsiveness to Caregiver	7.6	(.84)	7.9	(1.37)
Total Child	16.8	(1.32)	16.8	(2.30)
Child Contingency	6.8	(.79)	7.2	(1.23)

Because the t-test revealed a significant difference, a multivariate analysis of variance (MANOVA) was employed to compare mothers' and fathers' scores on the subscales of the Total Caregiver score (including the Caregiver Contingency score) and to determine where significant differences lay using univariate F-tests. The MANOVA was significant, $F (5, 14) = 5.70, p = .005$. In examining the results, fathers scored significantly lower than mothers on the Caregiver Contingency scale, $[F (1,18) = 9.12, p = .007]$ and on the Cognitive Growth Fostering subscale, $F (1,18) = 5.38, p = .032$.

Children's NCATS Scores

A second t-test had been planned to examine the difference between children's Total Child scores when they interacted with mothers' and fathers but was not needed as the means were identical. Levene's test was done to determine if there was homogeneous variance. The variances were not homogeneous, $F= 6.16, p= .02$. Children's scores with their mothers were more variable than with their fathers. No further analyses were conducted. The mean scores are reported in Table 4.1.

Level of Impairment

As an exploratory analysis, the data were examined to determine if level of motor impairments had an impact on NCATS scores for mothers and fathers in separate analyses. Children in Level I on the GMFCS were combined into one group ($n=6$) and the remaining children formed the other group ($n=4$). Because the numbers were small, nonparametric statistics were used. There were no significant differences between mothers of children with less severe physical challenges and mothers of children with more challenges for the Caregiver Total score ($p = .38$) or the Child

Total score, $p = .45$. There were no significant differences between fathers of children with less severe physical challenges and fathers of children with more challenges for the Caregiver Total score ($p = .20$). However, children with more severe impairments scored significantly higher when interacting with their fathers (mean rank = 7.75) than children with less severe impairments (mean rank = 4.92), $p = .04$. The mean scores for the groups are given in Table 4.2. These results must be treated with caution because of the small sample size.

Table 4.2 Caregiver Total Scores by Child's Level of Impairment

	<u>Less Impaired</u>		<u>More Impaired</u>	
	(<u>n</u> =6)		(<u>n</u> =4)	
Mother	Mean	(SD)	Mean	(SD)
Caregiver Total	38.33	(1.7)	37.25	(3.9)
Child Total	16.33	(1.9)	17.50	(3.0)
Father				
Caregiver Total	35.17	(3.4)	32.75	(1.9)
Child Total	16.17	(1.2)	17.75	(1.0)

Power Estimation

Ten mothers were compared with ten fathers from the same family unit. As the group sizes were equal ($p=q=1/2$) maximal critical effect size was obtained (Kraemer & Thiemann, 1987). The power was estimated using the Master Table given from Cohen (1977). For a one-tailed t-test at the .05 level of significance with an effect size of 1.31, the power was 78% (Appendix L).

CHAPTER 5

Discussion

Parent-Child Interaction

As predicted, the results of this pilot study revealed significant differences between mothers and fathers while interacting with their children with motor delays. Similar to another study that used the NCATS to observe parents' interaction with typically-developing children ages 13 to 24 months (Harrison et al. 2000), the mothers obtained higher Total Caregiver, Cognitive Growth Fostering, and Contingency scores. These findings are also consistent with Lamb's position (1997) that although both parents are capable of being responsive to their children, fathers often appear less able.

Cognitive Growth Fostering Scores

When the individual subscales of the Total Caregiver score were examined in order to identify the source of differences, fathers' and mothers' scores were significantly different only for the Cognitive Growth Fostering subscale. Both parents were equally sensitive to their child's cues and obtained similar scores for their response to the child's distress and for their ability to foster the child's social and emotional growth. The finding of significant differences only on this subscale is in keeping with findings from Harrison and Magill-Evans' (1996) study of 103 mothers and fathers of full-term and preterm infants. The mothers and fathers of the same child were included. Two other studies (Harrison et al., 2001; Nakamura et al., 2000)

found differences between parents on the Cognitive Growth Fostering subscale along with differences on other subscales. The different results may be due to the fact that these latter two studies included only typically-developing children and compared fathers to a sub-sample of mothers drawn from the NCATS normative database.

One reason why fathers may score lower on the Cognitive Growth Fostering subscale is related to evidence that mothers and fathers have different communication styles with their children. The Cognitive Growth Fostering subscale includes items that describe the caregiver's verbal communication style. For example, Item 40 captures the parent's ability to use more explanatory than imperative sentences in teaching the child. Marcos (1995) reported that mothers produced more descriptions of objects, actions and persons while fathers communicated more instructions and requests for objects and actions. Similarly, Item 41 is scored yes if the caregiver gives clear and unambiguous directions. However, there is evidence that fathers are less likely to adjust their speech to their child's developmental level (Le Chanu & Marcos, 1994), which may result in instructions that are less clear to the child. Although the sample size of this pilot study is too small to allow comparison of mothers and fathers on specific items, it is interesting to note that only 2 out of 10 fathers obtained a Yes on Item 41 compared to 6 mothers who provided their children with clear and unambiguous directions.

Caregiver Contingency Score

Fathers also scored significantly lower than mothers on the Caregiver Contingency scale, which combines items that tap caregiver contingent responses from all the subscales. This finding is consistent with other studies that used the

NCATS (Harrison et al., 1999, 2001; Nakamura et al., 2000) to compare fathers' scores with mothers' norms from the NCATS database. Other studies (Kornhaber & Marcos, 2000; Marcos, 1995) that observed mothers and fathers from the same family unit using a different observational system, also found fathers to be less contingent than mothers to their 2-year-old child's behaviors like initiations and exploration attempts in the context of a story-retelling task. This difference was suggested as being due to fathers task orientation. The NCATS includes items that capture whether a parent allows time for the child's exploratory attempts and initiations. For example, Item 7 describes the parent's ability to pause when the child initiates behaviors during the teaching episode. There are also items that address whether a parent allows for exploration and non-task manipulation of the task materials before giving any instructions (Item 5) as well as after directions are given (Item 37). Such items would penalize a father who does not allow for exploration attempts as a result of his focus on accomplishing the task.

A father's lower Contingency score on a teaching task may not be indicative of his overall ability to respond contingently to his child in other situations such as play interactions. As fathers spend more time in play interactions than in caregiving, it is important to consider contingency in situations other than teaching when determining if an individual father requires assistance in linking his behavior to that of his child's.

The lower contingency scores in a teaching situation are important to consider for persons working with fathers in early intervention programs. Parents are often given tasks to teach their child in order to facilitate their child's development. Adding

a task to the parent-child interaction may affect father-child interactions more than mother-child interactions. The effect of the context of the interaction needs to be explored systematically with fathers.

Comparison of Parent Scores with a Child with Motor Delays to Other Samples

When the mean Caregiver Total and Contingency scores were compared to means reported in the literature it was apparent that, although the same differences existed between mothers and fathers, both parents of a child with motor difficulties scored lower than parents of typically-developing children. The mean Caregiver Total scores for this study were 34.2 for fathers and 37.9 for mothers. The scores for fathers were 3.4 points below the mean for 49 fathers of typically-developing 13- to 24-month-old children (Harrison et al., 2001) and 2.7 points below the mean for 48 fathers of 12-month-old preterm children (Harrison & Magill-Evans, 1996). These differences in scores were not tested statistically. No cut-off scores to identify fathers at risk have been established so it is not possible to determine if the lower scores are cause of concern.

Mothers' scores were 6.6 points lower than those for 164 mothers of typically-developing 13- to 24-month old children drawn from the NCATS database (Harrison et al., 2001). The mothers were similar to those in this sample as they were White, married, and at least 20 years old. The NCATS manual (Sumner & Spietz, 1994) suggests that scores below 39 for White mothers of 13- to 36-month-old children are cause for concern. Five mothers in this sample scored below this cutoff and three mothers scored 39. However, these cut-off scores may not be relevant for this population as they were established with typically-developing children.

Other studies have also found that mothers of children with delays score lower on the NCATS than mothers with typically-developing children. The mothers in this study scored similarly to 49 Canadian mothers of 12-month-old preterm children ($M=38.4$) (Harrison & Magill-Evans, 1996). Shonkoff et al. (1992) found that mothers obtained significantly lower Total Caregiver scores than the norms from the NCATS database while interacting with their 16-month-old child with developmental delays ($M = 35.7$), or 12-month-old child with motor impairments ($M = 36.0$). Mothers in this study scored higher than mothers in Shonkoff et al.'s sample, which may be related to the fact that the children were less severely impaired. In Shonkoff et al.'s study 16 out of 43 children with developmental delays and 31 out of 46 children with motor impairment were considered to have a more severe level of cognitive and psychomotor impairment based on their scores on the Mental Scale of the Bayley Scales of Infant Development. When the data from this study were grouped by level of motor impairment (Table 4.6), mothers of more impaired children had slightly lower scores but still higher than those in Shonkoff et al.'s study.

Understanding why both parents scored lower on the NCATS when they interacted with a child with motor concerns is difficult as interaction is a complex and multidimensional issue. Many variables are involved and should be taken into account when interpreting such results (level of parental stress, self efficacy, caregiving burden, available intra and extra family support). Shonkoff et al. (1992), after studying a sample of 190 mothers interacting with a child with disabilities, concluded that mother-child interaction was not predicted either by severity of impairment or by the type of child's disability. Moreover they reported that low

NCATS Total Caregiver scores for mothers were not related to maternal sense of personal effectiveness (as measured by the Child Improvement Locus of Control Scales), or to the quality of the home environment (as measured by the HOME). Other possible explanations need to be studied as a low Total Caregiver scores on the NCATS may not be an indication of problematic dyadic interaction.

A parent may exhibit different kinds of behavior when trying to teach something new to a child, than when playing together. For example, Kogan and Tyler (1973) reported that mothers displayed less positive affect to their 15- to 48-month-old children with physical disabilities during a therapy session than during a play situation. During play there is no specific goal or desired performance, while a teaching episode requires specific behaviors arranged in an efficient manner (alerting, instruction, performance and feedback). The developers of the NCATS acknowledge that teaching a child something new places some stress on the interactive system (Sumner & Spietz, 1994). This stress may be even greater for parents who are already coping with other sources of stress.

According to Beckman (1991) and Shonkoff et al. (1992) both parents of children with special needs reported high levels of stress. Fathers reported high level of stress with respect to their attachment to their children while mothers experienced stress with respect to caregiving burden. Teaching something new to a child with motor delays may be more stressful for the parent due to the child's limited skills or because of the parent's concern that this will be yet another task which is too hard for the child. This may place an additional pressure on the interactional system. The result may be a parent who is more focused on the task trying harder and persisting more so the child can learn something new. Also, health care providers, who ask the parents to teach their

children new developmental tasks, may enhance this focus on the goal of the activities. It would be interesting to observe and explore the way that therapists model teaching interactions to the parents and whether they are task oriented when they interact with children with motor delays. Shonkoff et al. (1992) reported that the 190 mothers who participated in their study did not improve significantly on their Total Caregiver scores (36.3) on the NCATS after receiving early intervention services for one year (mean Total Caregiver scores after one year: 37).

Child's Contribution to the Interaction

The hypothesis that children with motor delays will obtain a higher Total Child score when interacting with their fathers than when interacting with their mothers was not supported. The children obtained similar Total Child scores when interacting with their mothers and their fathers. This is an unexpected and intriguing finding as much of the existing literature reported that children behave differently with their mothers and fathers and are more responsive to their fathers. Clarke-Stewart (1978) observed parent-child interactions of 20-month-old typically-developing children and concluded that children were more responsive to their fathers perhaps because they were expecting a more playful interaction. Similarly, studies that used the NCATS reported that typically-developing children in the first (Harrison et al. 1999, Nakamura et al. 2000) and second year of their life (Harrison et al. 2001) were more responsive to their fathers than were the children in the mothers' database (children were from different family units). A study of 103 preterm and full-term children did not find differences on the Total Child score for mothers and fathers of the same child (Harrison & Magill-Evans, 1996).

To understand why there were no differences on the Total Child score for the atypically-developing children in this study, it is necessary to understand the explanations for why differences have been observed for typically-developing children. When mothers and fathers interacted with their typically-developing child, fathers were more directive and task oriented than mothers (Conner et al., 1997). This focus on the goal of the activity and the limitation of the child's explorative initiations may contribute to an increased responsiveness from the child. Many items on the Child subscale- Responsiveness to Caregiver tap the child's display of subtle and potent disengagement cues. A child may exhibit disengagement cues more often when the caregiver is more directive or controlling which would explain why typically-developing children obtained higher Total Child scores when interacting with their fathers than with their less directive mothers.

In the present study of atypically-developing children, both mothers and fathers appeared to control the child's initiations and explorative behaviours. For example none of the fathers and only 2 of the mothers allowed for exploration of the task materials before giving instructions (Item 5). This is consistent with findings from Kogan and Tyler (1973) who found that mothers were controlling (exhibited more orders, repositions and prohibitions) during unstructured play with their 15- to 48-month-old children with physical disabilities. Hanzlik and Stevenson (1986) reported that mothers had a directive interaction style (increased commanding behaviours and physical contact) towards their 21-month-old children with physical disabilities. Moreover, in the present study more than half of the children exhibited disengagement cues as a response to their mothers' physical intrusion in their use of

the task materials (Item 71). In summary, it appears that because of the children's motor delays and subsequent early intervention programs, there may be an increase of maternal focus on the goal of the task and an increase of children's cues in response to this, decreasing the differences between mothers and fathers.

Another possible explanation for the finding that children were equally responsive to their parents may be that, because of the children's motor delays and participation in early intervention programs, fathers may provide less physical and arousing play and do more teaching so the children's responsiveness was not increased in anticipation of a more playful interaction. This explanation cannot be evaluated, as information on the father's participation in early intervention programming was not collected.

Child Total Scores in Comparison to Scores from Typically-Developing Children

The scores of the children who participated in this study (mean Total Child score: 16.8) were not a concern as all children scored above the cut-off scores provided by the NCATS manual (Sumner & Spietz, 1994) and similarly to the mean score of typically- developing children in a similar age range (13-to 24-months old) (Harrison et al. 2001). The reason why the children scored similarly with typically-developing children may be due to the fact that children's conditions allowed them to display the range of communication cues that are captured by the NCATS. Palisano et al. (1993) reported similar mean Total Child score (16) for 36 children 7- to 35-months-old with motor delays. However, Shonkoff et al. (1992) reported lower Total Child scores for the group with motor impairments (14.9) and the group with developmental delays (14.8). The children who participated in the Shonkoff et al.

study had a more severe level of psychomotor impairment than children in the current study. It is important to note that the lower scores for parents of children with motor delays in comparison to parents of typically developing children are not due to less interactive ability as measured by the child's NCATS scores. This makes the lower caregiver scores even more intriguing and removes simple explanations for the differences discussed earlier. It is important to try and understand the reasons for the lower scores.

Analysis by Level of Severity

When the data was examined to determine if the level of motor impairment had an impact on the Total Caregiver and Total Child scores, there were no significant differences between groups with one exception. Children with more severe impairments scored significantly higher when interacting with their fathers than did children with less severe impairments. Harrison et al. (1999) speculated that children might score higher when interacting with a parent during extended teaching interactions, as longer interaction episodes provide the child with a chance to display more behaviors. The average duration of fathers' teaching for the group of children with mild motor delays was 4.1 minutes while for the other group it was 5 minutes. While the length of interaction did not appear to explain the differences in responsiveness, duration does require more study as does the reason for why more time is used and the appropriateness of this behavior.

Limitations of the Study

Several limitations must be considered when interpreting the results of this study. The small sample size, which resulted from time and resource restrictions, is

the most important limitation. However, this pilot study has revealed some important trends to explore in future studies of parent-child interactions with this population. Additionally, the principal investigator who was not blind to the purpose of the study collected the data. To address this limitation, a second rater blind to the goal of the study scored 25 % of the videotapes to ensure consistency of data collection and inter-rater reliability was good. Because the sample was one of convenience, the results are subject to selection biases and it is expected that those parents willing to participate may have different interactional styles than those who were not. Findings can only be generalized to dyads with the same demographic characteristics. The children had relatively mild motor difficulties and results cannot be generalized to children with different diagnoses or functional abilities. One of the children that participated in the study was a twin. This may be a limitation, as parents of twins may have distinct interactional patterns. However, neither the parents' or the child's scores were very different from the mean scores of the groups.

Another limitation was that all of the parents were receiving early intervention services which makes it difficult to determine whether the child's interactive behavior, diagnosis or the services account for differences in scores. Were the children more responsive as a result of the early intervention that they received? Were the differences between mothers and fathers influenced by parental participation in early intervention services? Fathers' involvement in the child's program and the mothers' level of involvement were not measured and is a limitation.

Cognition and language were not measured during the home visit. While the results related to differences between parents are not affected by this limitation, it

does make it difficult to determine if the differences are related to the child's motor delay or some other unmeasured problem. Given that the same differences between parents have been found with parents of typically developing children, differences may reflect stable characteristics of mothers and fathers that are unrelated to whether the child is typically or atypically developing.

Finally, it is important to acknowledge the limitations of the NCATS as a tool of observation for father-child interaction. The development of the instrument was based on observation of mother-child dyads and as a result fathers' unique contribution may not be captured entirely. There is no standardized evaluation tool available though for parent-child interaction based on observations of fathers' interactive behavior. The dichotomous scoring of the NCATS and the brief duration of the episode may lead to loss of useful information regarding the child's contribution to the interaction (Lydia, 1993; Tesh & Holditch-Davis, 1997). However, a 2-hour naturalistic observation of mother's behavior was significantly correlated with Total Caregiver scores of NCATS (Tesh & Holditch-Davis (1997) so it does appear to be a valid measure of parent's behaviors. It is acknowledged that naturalistic observation could complement the use of a standardized measure.

Implications for Practice

Parents of children with developmental delays are eligible for family-centered early intervention services which are provided by a number of different disciplines. The quality of parent-child interaction is of major importance as it is linked with the child's overall development. In fact, it has been suggested that the impact of early intervention services on children's development is directly related to improvement of

parent's responsiveness (Mahoney, Boyce, Fewell, Spiker & Wheeden, 1998). Occupational therapists as members of the interdisciplinary team contribute to both the evaluation and enhancement of the dyadic interaction. The results of this pilot study indicate that both parents obtained lower mean Total Caregiver scores in comparison to parents who interacted with typically-developing children and the reasons for those differences must be addressed as part of early intervention programs.

One implication of the results for health care professionals is that fathers' interactional skills with his child must be considered. The fathers in this study all indicated that they regularly spent hours in play and caregiving with their child. It is imperative that these hours be beneficial to both the child and father to provide both with optimal experiences. Although the father's participation in early intervention programs was not measured in this study, health professionals should encourage fathers to be actively involved in early intervention, and develop strategies that would enhance their participation (father groups, weekend or late evening services). Fathers are often peripheral to their child's therapeutic plan (Turbiville, Turnbull & Turbiville, 1995). The structure of the programs and intervention approaches that are based on empirical analyses of mother-child dyads (Girolametto & Tannock, 1994), contribute to this lack of involvement. Research on fathers' interactions with children with disabilities is limited (Hornby, 1994) but necessary in order to design appropriate intervention plans (Crowe, 1981; Lillie, 1993).

Information from this study supports the results of other studies and indicate that fathers have a different interactional style than mothers when they interact with

their child. As described, they appear to be more focused on the goal of the activity. They scored low on items that tap parental encouragement of the child's exploratory behavior and parental provision of explanatory instructions. Lower scores in comparison with studies done with typically-developing children suggest that this task orientation may be even greater when the child has motor delays. This unique interaction style needs to be understood and supported. A variety of teaching styles within the family system may provide the child with a variety of unique experiences that he / she should not miss. The long term benefits of fathers' interactions needs to be explored.

For children with special needs, it has been suggested that it is especially important to observe the appropriateness and the quality of the directives that parents give during interaction (Moore et al. 1998). A directive is appropriate when it is reasonable for the child's interest and level of abilities. Similarly, a directive is high in quality when the manner in which it is given is not rough, and forceful but low-key, gentle and expressed as a suggestion. According to this, it is possible for a parent to redirect the child's initiations and do this in an appropriate, high quality manner. As a result, health care professionals should look for the appropriateness and the manner of the parental behaviors, which the NCATS with its dichotomous scoring, may not capture.

Although the mothers in this study scored higher than fathers, they scored lower in comparison with mothers observed interacting with typically-developing children. It was suggested that these lower scores might be due to an increased focus on the goal of the activity during a teaching episode with their child with motor

delays. Similar to fathers, mothers scored low on items that captured encouragement of child initiations and exploratory behavior. However, as mentioned above, the users of the NCATS should be careful in interpreting their observations as some of these directives might be appropriate for the child's developmental level and provided in an appropriate manner.

Information from observations of parent-child dyads during a teaching episode is critical because as part of our practice we often ask parents to teach their child new things. As occupational therapists, we should incorporate in our suggestions for achievement of developmental tasks, useful information on the way that parents could enhance their interaction style while teaching those tasks. Based on the results of this pilot, therapists should acknowledge fathers' unique style of interaction, and provide feedback to enhance the appropriateness and the quality of directives that both parents might offer. Occupational therapists also have the opportunity to model to the parents an optimal style of interaction during therapy sessions with the child and should make sure that they provide opportunities for child initiations and not simply focus on the achievement of the developmental tasks. To identify areas where parents could modify their interactions, therapists could look at individual items where parents may need assistance. Use of the NCATS helps focus on different aspects. For instance, although most of the parents in this study gave task related positive feedback, only 2 out of 20 parents praised their child's efforts broadly during the teaching episode. This could be an area for therapists to address.

The last implication for practitioners that came out of this pilot refers to the use of the NCATS scores. The Caregiver Total cutoff score provided in the manual

by the developers of the NCATS (Sumner & Spietz, 1994) for Caucasian parents of 13- to 36-month-old children is 39. Out of 20 parents that participated in this study only 2 scored above this cut off score. The rest of the participants scored either right at the cut-off point (5 parents) or below (13 parents). However, this cut-off score was established with mothers and typically-developing children. Health care professionals who use the NCATS to evaluate parents interacting with a child with motor delays should interpret the results with caution and make sure that they do not over-identify parents in need of assistance. It is necessary to establish norms for fathers and also for children with atypical development.

Future Research Considerations

As the results of this pilot study suggest that mothers and fathers interact in a different way during a teaching episode with their child with motor delays, a full study with a larger sample size is merited. This study could explore the differences which were detected in this pilot study in more detail. A range of severity levels would provide useful information about the impact of the degree of severity on the parent's and the child's interactive behavior. However, there may be a need to modify the test materials to accommodate children with more severe motor impairments. A combination of methodologies including naturalistic observation would be valuable as the NCATS is largely based on mother-child interaction and may not capture all of the fathers' behaviors. In future studies it would be important to look at the level of involvement with early intervention services for both parents and to include those who have been involved regularly as well as those who have had less involvement. It might be interesting to observe the primary early intervention provider interacting

with the child to determine if differences in interactions are attributable to the modeling by service providers and if their interactions also reflect the same characteristics as the parents. It is important to determine what are the most optimal patterns of interacting with children with motor delays. Parent report of time spent in caregiving or play appeared to be unreliable. Other methods of measuring father involvement need to be used in future studies.

Summary

In agreement with previous research on parent-child interaction the results of this pilot study revealed significant differences between mothers and fathers while interacting with their child, suggesting that parents may use different teaching interactional styles with their children. Fathers scored lower than mothers during a teaching interaction with their 10- to 28-month-old children with motor delays, probably because they are more task-orientated than mothers. However, it appears that because of the children's motor delays and subsequent early intervention programs, there may be an increase of maternal focus on the goal of the task, decreasing the differences between mothers and fathers.

The users of the NCATS should be careful in interpreting their observations, as some of the parental behaviors might be appropriate for the child's developmental level. They should look for the appropriateness and the manner of the parental behaviors, as the NCATS with its dichotomous way of scoring does not capture such qualitative aspects of the interaction. Based on the results of this pilot, therapists should acknowledge fathers' unique style of interaction, and provide feedback in

order to enhance the appropriateness and the quality of interactive behavior during a teaching episode.

This pilot study has revealed some important trends to explore in future studies of parent-child interactions with this population. Future research should employ a larger sample size, a range of severity levels, and a combination of methodologies including naturalistic observation. As the database of the NCATS includes only information from mother-child dyads, using cut-off scores that are developed from data on mothers may lead to incorrect clinical decisions. Similarly as norms for children with atypical development have not been established yet, caution is required in interpreting results obtained using the NCATS.

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Developmental Medicine & Child Neurology, 42, 292-296.

Appendix A

Nursing Child Assessment Teaching Scale (NCATS)

(Sumner & Spietz, 1994)

Reproduction of the scale is not permitted due to copyright restrictions.

More information regarding the NCAST can be obtained from:

University of Washington

Box 357920

Seattle, WA, USA

98195-7920

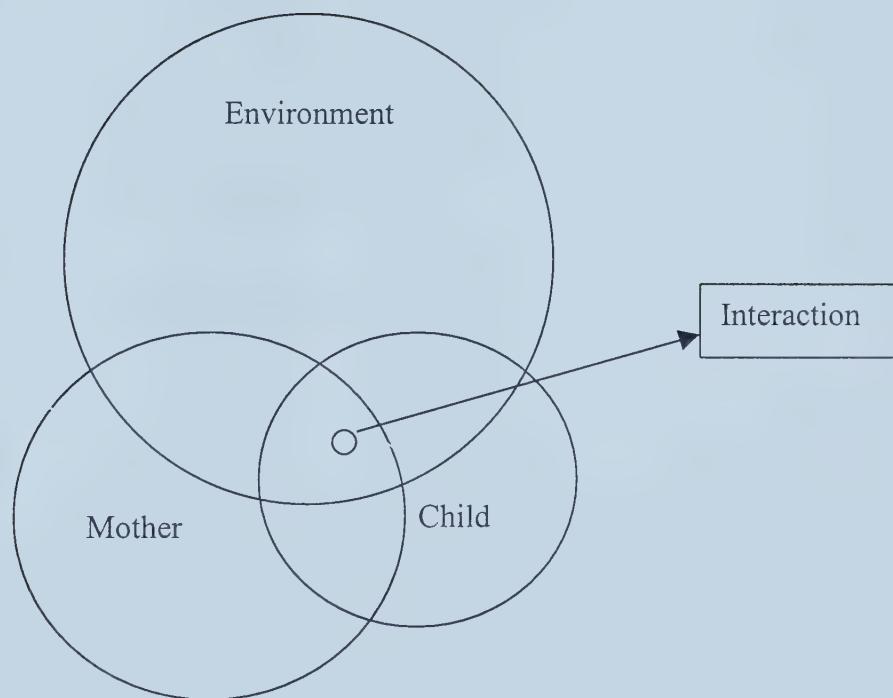
e-mail: ncats@u.washington.edu

Appendix B

Interactive Model

(Barnard & Eyres, 1979)

The Interactive Model



Source: Barnard, K.E., & Eyres, S .J. (Eds.), (1979). Child health assessment,

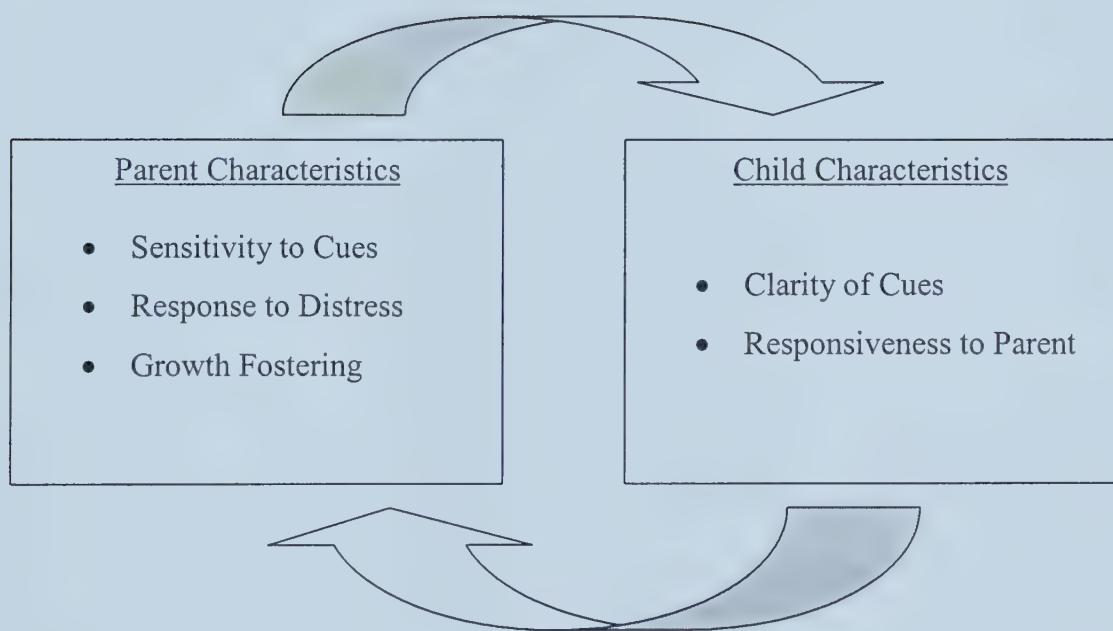
Part 2: The first year of life. Washington, DC: U.S. Government Printing Office.

Appendix C

Barnard Model

(Sumner & Spietz, 1994)

The Barnard Model



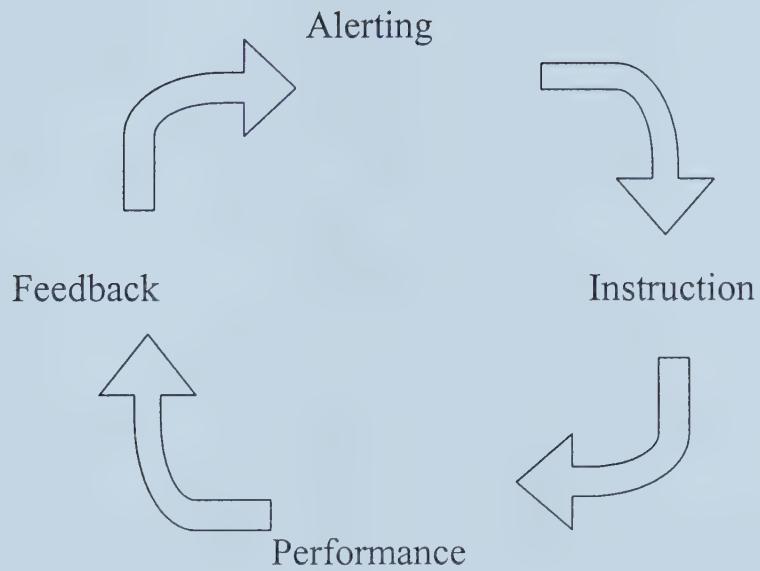
Source : Sumner, G., & Spietz, A. (1994). NCAST caregiver /parent-child interaction teaching manual. Seattle WA: NCAST Publications, University of Washington, School of Nursing.

Appendix D

The Four Elements of the Teaching Loop

(NCAST, 1990)

The Teaching Loop



Source: NCAST (1990). Keys to caregiving: A self-instructional video series.

Seattle, WA: NCAST Publications

Appendix E

Brochure

How do you play with your Child?



The way you do things with your child is important for your relationship and for your child's development. Studying how mothers and fathers show their children something new can help us to plan better services for families.

Who? We are looking for mothers and fathers of children under 3 years of age.

What's involved? Just teach your child something new from a list of activities while we watch. For example, to reach for a rattle, play pat-a-cake or identify a picture. This takes only 5 to 10 minutes per parent.



Where? At your home or if you prefer at the University of Alberta.

Why participate? You can learn more about the way you interact with your child & how your child responds!

If you are interested call Joyce at (780) 492-040

Appendix F

Information Letter

Information Letter

Title: Mothers' and fathers' interactions with a child receiving early intervention

Investigators: Dr. Joyce Magill-Evans,

Effie Ganadaki, Graduate student

Occupational Therapy Department, University of Alberta.

Contact : phone: (780) 492-0402

e-mail: ganadaki@ualberta.ca, joyce.magill-evans@ualberta.ca

Purpose: The goal of this study is to find out how mothers and fathers teach their children something new.

Background: The way parents do things with their children is important for their relationship. It is also important for the child's development. Therapists often ask you to teach a task to your child. Information on how mothers and fathers show their children something new can help to plan better care for families.

Procedure: If you choose to participate, an occupational therapist (Effie Gkanadaki) will make one visit to your home. If you would prefer, she could see you at the university. Both mother and father should be present. We will call you before Effie comes to ensure it is a good time to do the study (for example your child is feeling well, alert). You will choose something new to teach your child from a list of activities. For example, to reach for a rattle, play pat-a-cake or identify a picture from a book. Then the therapist will videotape one parent showing the child how to do the task. This takes about 10 minutes. We need to videotape you because things happen quickly. During videotaping, the other parent will be completing a brief questionnaire in another room. This questionnaire asks you to describe things like your job and education. Then parents will switch tasks. The therapist will also observe how your child moves. The whole visit will take 45 to 60 minutes. We would like to contact the agency that assessed your child's skills to obtain the child's score on a developmental test.

Benefits: The results of this study will improve our knowledge about how mothers and fathers work together with their children. At the end of this study you can learn more about the way you interact with your child.

Risks: There are no risks for you or your child.

Confidentiality: All information will be confidential, except when professional codes of ethics or the law requires reporting. The information will be kept for at least seven years after the study is done. It will be kept in a locked cabinet. Your name will not be attached to the information. Your name will also never be used in any presentations or publications of the study results. The information gathered for this study may be looked at again in the future to help us answer other study questions. If so, the ethics board will first review the study to ensure the information is used ethically.

Freedom to withdraw and to refuse to answer a question: You can refuse to answer any questions or stop the videotaping at any time. Also you can withdraw from the study at any time.

Additional Information: If you have any questions, you can phone one of the researchers .The phone number is on the top of the page. If you wish to talk with a person that is independent from the project, please contact Dr. Paul Hagler, Associate Dean of Graduate Studies and Research, in Faculty of Rehabilitation Medicine, University of Alberta.

Phone : (780)492-9674 Fax: (780) 492-1626 e-mail: paul.hagler@ualberta.ca

Appendix G

Content of the Follow-Up Phone Calls

-Hello, my name is _____, and I'm a therapist at the Glenrose.

May I speak with Mr./ Ms?

-I am calling you about a study that is being conducted by the Occupational Therapy Department at the University of Alberta.

-Have you received an information letter about a study called "Parent-Child Interaction"? It was mailed in early June by clinic coordinators at the Glenrose Rehabilitation Hospital.

Yes:

- Would you like me to give your phone number to the researchers so they can contact you and answer any questions which you may have about the study?

No:

- Introduction of the study from the information letter.

- Now that you know what is involved in the study would you be willing to have your phone number given to the researchers so they can contact you and answer any questions which you may have about the study?

Thank you for your time.

Appendix H

Consent Form

Consent Form

Title of the project: Mothers' and fathers' interactions with a child with motor delays.

Investigator: Ganadaki Eftychia

Graduate student Occupational Therapy Department, University of Alberta.

Phone :(780) 492-0402

e-mail: [ganadaki @ualberta.ca](mailto:ganadaki@ualberta.ca)

Co-Investigator: Dr. Magill-Evans Joyce, PhD

Professor in Occupational Therapy Department, University of Alberta.

Phone :(780) 492-0402

e-mail: joyce.magill-evans@ualberta.ca

Do you understand that you and your child have been asked to be
in a research study?

Yes No

Have you read and received a copy of the attached Information Sheet?

Yes No

Do you understand the benefits and risks involved in taking part in this
research study?

Yes No

Have you had an opportunity to ask questions and discuss this study?

Yes No

Do you understand that you are free to refuse to participate or withdraw
from the study at any time? You do not have to give a reason and it will
be no adverse consequences.

Yes No

Has the issue of confidentiality been explained to you? Do you understand
who will have access to your records?

Yes No

Do you understand that the investigators will obtain your child's scores on
a developmental test from your child's program ?

Yes No

This study was explained to me by: _____

Date: _____

"I agree to take part in this study. I also agree for my child to participate in this study."

Signature of Research Participant (parent): _____

Printed Name: _____

"I believe that the person signing this form understands what is involved in the study
and voluntarily agrees to participate."

Signature of researcher: _____

Printed Name: _____

Appendix I

Demographic Data Forms

Code

Date

Demographic Data Form / Primary caregiver

1. What is _____ date of birth: month _____ /day _____ /year

2. What is your ethnic background?

3. What grade did you complete in school? Grade

4. Please indicate how many years you attended each of the following:

University /college

Technical school such as NAIT

Other (specify) _____

5. What is your date of birth: month ____ /day ____ /year ____

6. Are you employed? No Yes If yes, please describe your current job.

Title: _____

Things you do: _____

7. Yearly Family Income:

b) \$ 20.000 - 29.999 f) \$ 60.000 - 69.000

8. If you have other children please list the year of their birth for each of them:

a) _____ d) _____ g) _____

b) _____ e) _____ h) _____

9. While you are working who cares for _____?

Your partner/ spouse

Other family members

Babysitter / nanny

Day care

Day home

Other (please specify) _____

10. On a typical day when you work, how much time do you spend?

a. giving care to this child?

b. playing with this child?

11. On a typical day when you are not working, how much time do you spend:

a. giving care to this child?

b. playing with this child?

Code

Date

Demographic Data Form / Secondary caregiver

1. What is your ethnic background? _____

2. What grade did you complete in school? Grade _____

3. Please indicate how many years you attended each of the following:

University /college _____

Technical school such as NAIT _____

Other (specify) _____

4. Are you employed? No Yes

If yes, please describe your current job.

Title: _____

Things you do: _____

5. What is your date of birth: month ____/day ____/year ____

6. In the last seven days, how many times have you had sole responsibility for the care of this child?

_____ times.

This is:

- the same number of times as usual
- less than usual
- more than usual.

7. On a typical day when you work, how much time do you spend?

a. giving care to this child?

b. playing with this child?

8. On a typical day when you are not working, how much time do you spend:

a. giving care to this child?

b. playing with this child?

Appendix J

Gross Motor Function Classification System for Cerebral Palsy
(Palisano et al., 1997)

Reproduction of the scale is not permitted due to copyright restrictions.

More information regarding the GMFCS can be obtained from:

Neurodevelopmental Clinical Research Unit

McMaster University

12080 Main Street West, Hamilton

Ontario L8S 4K1

Canada

(905) 525-9140 Ext.27850

e-mail: ncru@fhs.mcmaster.ca

Appendix K

Information from Referral Agency

Code

Date

Information from Referral Agency

1. Program in which child participates:

2. Measure used to indicate the child's motor abilities:

- Alberta Infant Motor Scale (AIMS)
- Peabody Developmental Motor Scales
- The Diagnostic Inventory for Screening Children (DISC)
- Diagnosis _____
- Other (specify) _____

3. Score child obtained on this measure

4. Date child evaluated

month _____ /day _____ /year _____

Appendix L

Power Estimation

Power Estimation

The parameter d (effect size), was calculated using the values m_B , (mothers' mean of NCATS Total Caregiver score) m_A , (fathers' mean of NCATS Total Caregiver score), and σ (pooled standard deviation), that were based on the results from this study. According to Cohen (1977) the parameter d was calculated as:

$$d = \frac{m_B - m_A}{\sigma}$$

$$= \frac{37.9 - 34.2}{2.83}$$

$$= 1.31$$

According to the Master Table given by Cohen (1977), for a one-tailed test at a 0.5 level of significance with a sample size of 10 a 78% power is obtained.

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